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Applicant Feng Chen
Amendment filed with the RCE

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of claims:

Claims 1- 36 (CANCELED)

37. (NEW) A CMP retaining ring, comprising:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of a substrate;

a plurality of grooves on said lower surface of said retaining ring;

said plurality of grooves extending from said inner peripheral surface to said outer peripheral surface;

said plurality of grooves are spaced apart;

said plurality of grooves include at least a first groove and a second groove;

at least a portion of said first groove has a rounded cross sectional contour or slanted cross sectional contour.

38. (NEW) The CMP retaining ring of claim 37 wherein said lower surface of said retaining ring is essentially flat with only said plurality of grooves therein.

39. (NEW) The CMP retaining ring of claim 37 wherein said plurality of grooves do not intersect;

said plurality of grooves only communicate between said inner peripheral surface and said outer peripheral surface.

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40. (NEW) The CMP retaining ring of claim 37 wherein said plurality of grooves are linear; and
said plurality of grooves are uninterrupted extending from said inner peripheral surface to said outer peripheral surface;
said lower surface does not comprise an annular recess.
41. (NEW) The CMP retaining ring of claim 37 wherein said first groove has a semicircle profile.
42. (NEW) The CMP retaining ring of claim 37 wherein said plurality of grooves have a semicircle profile.
43. (NEW) The CMP retaining ring of claim 37 wherein said first groove has a semicircle profile and said first groove has a rounded top corner adjacent to the lower surface of the retaining ring.
44. (NEW) The CMP retaining ring of claim 37 wherein said first groove has a semicircle profile with a radius between 2 and 15 mm.
45. (NEW) The CMP retaining ring of claim 37 wherein said first groove is comprised of: sidewalls, a flat horizontal bottom, and rounded bottom corners between said sidewalls and said flat bottom;
said first groove has curved sidewalls with a curved cross sectional shape.
46. (NEW) The CMP retaining ring of claim 37 wherein said first groove has rounded corners adjacent to a bottom of said first groove.
47. (NEW) The CMP retaining ring of claim 37 wherein said first groove has rounded top corners adjacent to the lower surface of said retaining ring.
48. (NEW) The CMP retaining ring of claim 37 wherein said first groove has vertical sidewalls and an about horizontal bottom and at least one rounded corner between said sidewalls and said horizontal bottom; and rounded top corners near the lower surface of said ring.

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49. (NEW) The CMP retaining ring of claim 37 wherein said first groove has straight sidewalls, top corners, bottom corners; and an about horizontal bottom, said bottom corners are rounded or curvilinear; said bottom corners are adjacent to said horizontal bottom and straight sidewalls.

50. (NEW) A CMP retaining ring, comprising:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of a substrate;

a plurality of grooves on said lower surface of said retaining ring;

and said plurality of grooves extending from said inner peripheral surface of said retaining ring, to said outer peripheral surface of said retaining ring;

said plurality of grooves are spaced apart; said plurality of grooves only communicate between said inner peripheral surface and said outer peripheral surface;

said plurality of grooves include at least a first groove and a second groove;

at least a portion of said first groove has a rounded cross sectional contour or slanted cross sectional contour.

51. (NEW) The CMP retaining ring of claim 50 wherein said plurality of grooves are uninterrupted extending from said inner peripheral surface to said outer peripheral surface; said lower surface does not comprise an annular recess.

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52. (NEW) The CMP retaining ring of claim 37 wherein said first groove has a semicircle profile.

53. (NEW) The CMP retaining ring of claim 37 wherein said first groove has a semicircle profile and said first groove has a rounded top corner adjacent to the lower surface of the retaining ring.

54. (NEW) The CMP retaining ring of claim 37 wherein said first groove has a semicircle profile.

said plurality of grooves are linear; and

said plurality of grooves are uninterrupted extending from said inner peripheral surface to said outer peripheral surface;

said lower surface does not comprise an annular recess.

55. (NEW) A process for chemical-mechanical polishing a substrate comprising:

said substrate is disposed within a polishing head facing a polishing table; said substrate is retained within the polishing head by a retainer ring, and

said retaining ring is comprised of:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of the substrate;

a plurality of grooves on said lower surface of said retaining ring;

said plurality of grooves extending from said inner peripheral surface of said retaining ring to said outer peripheral surface of said retaining ring;

said plurality of grooves are spaced apart;

said plurality of grooves only communicate between said inner peripheral surface and said outer peripheral surface;

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said plurality of grooves include at least a first groove and a second groove;

at least a portion of said first groove has a rounded cross sectional contour or slanted cross sectional contour;

supplying a slurry to said polishing table or to said polish head;
moving the polishing table and/or the polishing head to chemically polish the wafer.

56. (NEW) The process of claim 55 which further includes: said substrate is a wafer, forming a deposition layer on the surface of said wafer and chemical mechanically polishing said deposition layer.

57. (NEW) The process of claim 55 wherein said first groove has a semicircle profile.

58. (NEW) The process of claim 55 wherein said first groove has a semicircle profile and said first groove has a rounded corner adjacent to the lower surface of the retaining ring.

59. (NEW) The process of claim 55 wherein said plurality of grooves are uninterrupted extending from said inner peripheral surface to said outer peripheral surface;
said lower surface does not comprise an annular recess.

60. (NEW) The process of claim 55 wherein said groove has rounded edges adjacent to the bottom of said grooves.

61. (NEW) The process of claim 55 wherein said groove has rounded top edges adjacent to the lower surface of said retaining ring.